

Section 4: A Habitat Strategy for Lake Erie

4.1 Introduction

The Lake Erie LaMP has identified habitat loss and degradation as one of the top three stressors that must be addressed to restore Lake Erie. The alteration of natural ecosystems through the loss of forests, wetlands, and grasslands has had marked effects on biotic processes and fish and wildlife populations in the Lake Erie basin.

The Lake Erie LaMP beneficial use impairment assessment found fish habitat in Lake Erie tributaries (including riverine estuaries), shoreland areas (including coastal



wetlands), and nearshore areas to be impaired. Over 80% of historical coastal wetlands have been lost and most of the remaining wetlands are diked or have degraded physical or chemical properties. All 15 of the general habitat types representative of, and inextricably tied to, the aquatic components of the Lake Erie environment are impaired within at least one Lake Erie basin jurisdiction. Degradation of 14 of these habitat types are resulting in unmet wildlife population management objectives for particular wildlife species. Upland marsh, wet meadow, emergent macrophytes, bog/fen and interdunal wetlands are the five most commonly degraded habitats responsible for this problem. Benthic habitats in the lake have also been lost or disrupted. The loss of chironomid larvae and benthic invertebrate diversity in Lake

Erie tributaries indicates that these habitats are also degraded.

In addition to loss of habitat, the beneficial use impairment assessment reports identified the loss of ecological function, or how efficiently the habitat supports the biological community that inhabits it. For example, dams prevent fish from swimming upstream to spawn; dredging and/or filling wetlands create avenues for exotic invasive species, such as purple loosestrife, to proliferate and greatly reduce the nutritional value provided by the wetland. Ecological function is impaired not only because of outright habitat destruction, but also because of anthropogenic activities that have increased sediment loads to the lake and its tributaries, increased soil and water temperatures, and altered river flows and hydrology. There is a direct connection between land use, non-point source runoff and habitat quality.

4.2 Habitat Strategy Development

In order to address the key issue of habitat loss and alteration, the Lake Erie LaMP 2000 document sought to present a habitat action plan. With the emphasis on “action”, the LaMP 2000 effort focused on identifying ongoing or planned projects that would lead to removal of a habitat impairment and serve to meet the ecological objectives of the LaMP. Considerable review since then suggested there was a larger need for strategic planning rather than trying to prioritize projects for implementation. There are already a large number of habitat related projects underway by a variety of agencies and local groups. It is the LaMP’s role to determine what it can best do, from a value added perspective, to tie existing efforts together and address gaps to see impacts/results on a lakewide basis.

The habitat strategy provides a framework to guide and coordinate habitat protection and restoration efforts in the Lake Erie basin. The limited amount of existing habitat monitoring has been focused largely on species presence or absence and the amount of

habitat acquired or restored. More attention needs to be placed on population numbers and habitat function. For example, marshes may still remain in some areas, but if they consist of a monoculture of cattails or purple loosestrife, they may not be providing the necessary diversity of plants and communities to support the wildlife that depend on the marsh during migration or the breeding season. The focus of the habitat strategy is on habitat preservation and restoration and improving the ecological function of habitats. It also considers the preservation, restoration and enhancement of the ecological processes that create and maintain habitats.

One of the first steps in development of the habitat strategy is working with key groups and agencies involved in habitat protection, restoration and management in the Lake Erie basin to determine appropriate basin-wide goals and the value of the Lake Erie LaMP's support and involvement. The Lake Erie LaMP has already compiled a long list of the many programs and organizations that may support the development and implementation of a Lake Erie Habitat Strategy.

The results of the ecosystem modeling exercise for the Lake Erie LaMP indicate that land use management is the key to restoring Lake Erie. Land use is also the key to improving habitat. Land use management generally includes actions in the following categories; agricultural non-point source runoff; urban and land use development controls; preservation; and restoration, including stewardship incentives. To illustrate the types of existing programs with which the LaMP will need to coordinate to influence land use practices affecting the lake, several examples of representative programs are described below. The impact of exotic species is also important to habitat in the Lake Erie basin, and an example of how *Phragmites* may be impacting habitat is presented. A brief description of several of the habitat mapping projects that will be useful to the LaMP is included. Planning for long-term fluctuations in water levels and climate change must also be considered.

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4.3 Agricultural Non-point Source Runoff

Ontario Environmental Farm Plan

The Ontario Environmental Farm Plan is a successful self-risk assessment tool involving partnerships with broad stakeholder involvement from farm groups and government. The Ontario Farm Environmental Coalition stakeholder groups drive the initiative, and partnered with government ministries, agencies, non-governmental organizations and farm groups to develop the Environmental Farm Plan process. Through the Environmental Farm Plan, farmers learn about environmental strengths on their farms; identify areas of concern; and implement actions to improve environmental conditions. Dollars put toward corrective on-farm actions by government and from farmers' pockets have shown that contributions have been made toward 3 important areas: soil management, nutrient storage and water wells. Lake Erie county farmers have spent \$16.9 million of the \$29.6 million available on on-farm environmental actions. Moreover, Lake Erie counties have received 52% of incentive grant dollars paid to Ontario farmers for undertaking on-farm environmental actions. (Ontario Soil and Crop Improvement Association, 2001). The 28,594 registered farm businesses in the Lake Erie basin represent approximately 50% of the 56,207 registered farm businesses for the whole province. The Ontario Farm Environmental Coalition was presented with a "Success Story" award for the Environmental Farm Plan at the State of the Lakes Ecosystem Conference (SOLEC) in 2000. (Roberts, Personal Communication 2001).

Ontario Rural Clean Water Programs

Currently, many Ontario Conservation Authorities have programs targeting rural land use that encourage the use of Best Management Practices (BMP). The continuation and expansion of these programs within the Lake Erie basin will be critical to achieve the objectives for rural land use established by the Lake Erie LaMP. While each watershed has developed a program tailored to its needs, there are common elements:

- o Best management plan implementation projects that recognize the private landowner is key.
- o Information is provided to landowners regarding the impacts of their activities on the Lake Erie ecosystem. The decision to act is that of the landowner.
- o The project integrates aquatic and terrestrial habitat conservation and water quality on private lands.
- o Where landowners express an interest, local participation from community groups, fish and game clubs, and schools is encouraged.
- o The thrust of the program is to encourage sustainable land use practices that foster soil, water and wildlife conservation in the Great Lakes basin.



Photo: Craig Merkle

The strength of this program is that it facilitates improvements in rural/ agricultural land use practices by the group most qualified to do the work, the innovative landowners themselves. These innovative farmers are willing to try new approaches, but of course there are no guarantees of success. The incentive grants offered through this program can offset some of the financial risk, allowing an innovator to invest in updated equipment and technology. Incentive grants are provided through a variety of partners including government and industry and coordinated by a central contact. This allows the land user to “put it to the test”. If it is proven to work, other land users become willing to try it and the

technology spreads. For information on where these programs are offered in the Lake Erie Basin see Table 4.

Table 4: Rural Clean Water Programs offered in the Ontario Lake Erie Basin

Conservation Authority Contact	Regional Municipality/County
Grand River Conservation Authority	Counties of Wellington and Brant, Regional Municipality of Waterloo-Wellington
Catfish Creek Conservation Authority	Elgin, Brant and Middlesex Counties
Kettle Creek Conservation Authority	Elgin and Middlesex Counties
Long Point Region Conservation Authority	Elgin, Kent, Oxford, Brant, Haldimand, and Norfolk Counties
Lower Thames Valley Conservation Authority	Kent, Middlesex, and Elgin Counties
St. Clair Region Conservation Authority	Middlesex County
Lambton County Stewardship Network	Lambton County
Upper Thames River Conservation Authority	Middlesex, Oxford and Perth Counties
Essex Region Conservation Authority	Essex County

Clean Water Act Section 319 Program

The Clean Water Act Section 319 Program provides grant money to States, territories, and Indian tribes to support non-point source projects (both agricultural and urban). The U.S. EPA administers these funds. The 319 program has supported successful agricultural projects focusing on phosphorus reduction in the Maumee River basin in Ohio, as well as in Southeast Michigan (Monroe, Washtenaw, and Wayne counties). Agricultural non-point source projects funded by 319 are currently underway in the Black River basin in Ohio.

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP) is a U.S. Federal-State conservation partnership that targets significant environmental effects related to agriculture. It combines the existing Federal Conservation Reserve Program (CRP) with State programs to provide a framework for the U.S. Department of Agriculture to work with State and local interests to meet state-specific environmental objectives. This is an incentive-based program whereby landowners enter into 14 to 15 year contracts with the U.S. Department of Agriculture to convert cropland to conservation practices (buffers, windbreaks, wetlands, filter strips, grassed and wooded riparian buffers, etc.).

An Ohio CREP focused on the western basin of Lake Erie was initiated in May 2000. The goals of the Ohio CREP are: to reduce the amount of sediment entering the western basin by over 2,325,000 metric tons over the next 20 years; significantly reduce nutrients and pesticides entering the western basin and its tributaries; protect 5,000 miles of streams in the western basin watershed from sedimentation; and improve wildlife habitat in the project area. Approximately 67,000 acres have been targeted for enrollment over the next 20 years. To date, 5,259 acres have been enrolled (actually converted to conservation practices), with an additional 5,664 acres in contract, for a total of 10,923 acres.

The State of Michigan also has a CREP program. The goal is to enroll 80,000 acres in three selected watersheds across the state. The River Raisin, which empties into the western basin, is the only selected watershed in the Lake Erie basin. The goals are similar to those of the Ohio CREP. To date, 2,408 acres in the River Raisin watershed have been enrolled, with contracts pending for an additional 380 acres, for a total of 2,788 acres.

Nutrient Management Planning (NMP) Tools

Matching all nutrient inputs, such as commercial fertilizers and manure, to crop requirements is a key area where Ontario farmers are improving land use practices to reduce environmental risk. The adoption of Nutrient Management Planning tools as a production practice is allowing more farmers to optimize all sources of farm nutrients. This helps to maximize economic returns, minimize surface water and groundwater problems and maintain or improve soil health. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the University of Guelph developed Nutrient Management Planning software (NMAN) that allows farmers to track all land-applied materials containing nutrients. The trend toward larger farm size with more livestock has resulted in the drafting and adoption of nutrient management by-laws by some municipalities.

At present, an array of legislative and regulatory provisions, guidelines, voluntary best management practices and localized municipal by-laws govern the application of materials to agricultural land in Ontario. To promote creation of a standardized process, Ontario introduced the Nutrient Management Act (Bill 81). The proposed act is enabling and will provide the authority to establish province-wide regulations and standards to address the effects of agricultural practices on the environment, especially as they relate to land-applied materials containing nutrients. These materials include manure, commercial fertilizers, biosolids generated by municipal sewage treatment plants, septage from pumped septic tanks, industrial pulp and paper residuals, and food processing wastes. The new province-wide standards would supersede municipal by-

laws and be linked to other pieces of provincial legislation such as the Ontario Environmental Protection Act.

4.4 Urban and Development Land Use Controls

Ohio Lake Erie Watershed Balanced Growth Strategy

In 2000, the Ohio Lake Erie Commission released the Ohio Lake Erie Protection and Restoration Plan. Input from 16 focus groups, public comments and state agencies resulted in 84 specific recommendations to improve the environment, recreational opportunities and economy of Lake Erie and its watershed in Ohio. One of the recommendations was to commission a panel of diverse expertise to create a “Lake Erie Watershed Balanced Growth Strategy.” The panel was established in November 2001 and consists of representatives of government, business, conservation groups, academia, agricultural interests and other stakeholders. In addition to the strategy, several incentive and special recognition awards are planned to encourage adoption of balance growth practices, as well as the creation of a model Lake Erie zoning ordinance and building code.

The Grand Strategy

An integrated management plan for the Grand River watershed is now being developed as part of The Grand Strategy. The Grand River in southern Ontario suffered from years of degradation and industrialization during the first third of the twentieth century. As a result of the combination of programs undertaken by the Grand River Conservation Authority and its partners over the last 60 years, the health of the Grand River and its tributaries has improved significantly. In fact, the river has improved so much that in 1994, it was declared a Canadian Heritage River. This has resulted in many community-based and collaborative efforts to improve river health and heritage conservation. The Grand Strategy includes a community-based fisheries management plan and a dynamic model to predict the impact of sewage treatment plants, urban runoff and diffuse sources of pollution to the Grand River.

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4.5 Habitat Preservation

Several major purchases occurred over the past two years to set aside some significant areas as preserves. The Nature Conservancy of Canada purchased Middle Island, which is managed through Parks Canada. The Michigan Chapter of the Nature Conservancy has protected 8-acre Calf Island, one of the last undeveloped marshes in the Detroit River. The U.S. and Canada are working toward the protection and restoration of the wetlands along the lower Detroit River. Under the Great Lakes Coastal Restoration Grant program, the Ohio Department of Natural Resources recently awarded almost \$900,000 to Put-in-Bay Township to assist in the purchase of 9 acres on the East Point of South Bass Island, including the preservation of approximately ¼ mile of undeveloped shoreline. The Nature Conservancy of Canada purchased the 572 acre Clear Creek Forest along the Canadian Lake Erie shore near Chatham-Kent, an area slated for logging and home to several nationally rare species of birds. An additional 228 acres adjacent to the forest was recently purchased.

4.6 Habitat Restoration

Cuyahoga River Remedial Action Plan

With the assistance of a grant from U.S. EPA Great Lakes National Program Office, the Cuyahoga River RAP has completed four stream bank restoration projects. Bioengineering techniques were used to address erosion and flooding problems while improving stream bank habitat. Each site posed different challenges so different techniques

were used at each site. Local residents and volunteers planted hundreds of trees, shrubs and ground cover that quickly took root to hold stream bank soils in place. The foliage provides crucial shading to the streams and creates additional habitat for fish and wildlife. A series of public workshops was held to further educate homeowners, public officials, and design and construction engineers in the use of stream restoration and bioengineering techniques.

Canard Valley Habitat Restoration Project, Ontario

The 121-hectare Canard Valley site is located in the Detroit River area of concern along the Canard River, the largest Canadian tributary to the Detroit River. The site is presently comprised of old-field habitat and constitutes an entry point into one of the largest Environmentally Significant Areas (ESA) in the area of concern and the Essex region - the Canard River Kentucky Coffee Tree ESA. The goal of the project is to implement a large-scale upland forest habitat restoration project utilizing locally sourced native Carolinian species to create interior forest habitat. In addition, some riparian and wetland enhancement along the Canard River corridor will be undertaken. Interior forest habitat is critically imperiled in the Essex region and exists at only a few locations in the Detroit River watershed. The restored interior forest will provide habitat for cerulean warblers and other rare interior forest birds. The plan is to restore a total of 40 ha of habitat (54,700 trees planted and a 1.5 ha wetland created on the floodplain associated with the south bank of the Canard River) while strengthening local, community-based stewardship actions. The project is proceeding as part of the Biodiversity Conservation Implementation Program for the Essex Region. Partners in the project include the Essex Region Conservation Authority, Environment Canada, Ontario Great Lakes Renewal Foundation, and Ontario Power Generation.

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4.7 Exotic Species Control

Historical Distribution and Abundance of *Phragmites australis* at Long Point, Ontario

The recent expansion of *Phragmites australis*, an exotic and invasive wetland plant, throughout many lower Great Lakes coastal wetlands has caused concern among resource managers due to the belief that it degrades waterfowl habitat and reduces biodiversity. Long Point contains some of the most important staging wetlands for waterfowl on the Great Lakes, and anecdotal evidence suggests that *Phragmites* has been expanding rapidly in some of these habitats. *Phragmites* was present in 1945, (54ha) and in 1964 (69ha) but had declined in abundance to less than 4ha by 1985. A moderate annual rate of increase occurred between 1985 (4ha) and 1995 (18ha), and an exponential increase occurred between 1995 and 1999 (142ha). The primary species and communities that were replaced or colonized by *Phragmites* between 1995 and 1999 were marsh meadow (33%), *Typha* spp. (32%), other mixed emergents (8%), sedge/grass hummock (10%), and open water (5.5%). If *Phragmites* continues to expand at current rates, it could theoretically cover 13,308 ha (60% of the study area) at Long Point by 2010. Evidence suggests that *Phragmites* abundance is negatively correlated with Lake Erie water depth and positively correlated with ambient temperature. Given the relation between *Phragmites* abundance and both temperature and water depth, if global warming predictions are realized, *Phragmites* will continue to expand on the lower Great Lakes. Wildlife use studies are presently being conducted to determine if *Phragmites* is in fact underutilized by wildlife at Long Point.

Effect of Dams on Stream Hydrology and Aquatic Organisms

Dams that limit or block fish access to historical upstream spawning, feeding, and nursery habitat affect most Lake Erie tributaries. Pike, sauger, muskellunge, and sturgeon have been the most severely affected, but some river spawning walleye stocks have also been depleted (e.g. Grand River, Ontario; Sandusky River, Ohio). Other effects of dams include: reducing fish biodiversity; changing light penetration, water depth, temperature and hydro-period (i.e. how deep water is for how long); create sediment traps in reservoirs behind dams, sometimes



allowing build-up of contaminants; and eliminating habitat historically used by local species for some phase of their life cycle. Spawning runs of walleye, mooneye, and naturalized rainbow trout in some eastern basin tributaries are improving due to dam removal, fish-way construction, and in-stream and watershed rehabilitation projects (e.g. Big Creek, Grand River, Ontario). Dams have very complex impacts on the ecology of rivers and there is not enough data to predict all of the impacts dam removal will have on a given river's ecosystem. The effects of individual dam removal on each tributary or different stream reaches of a given tributary will vary physically and biologically. Dam removal in the lower reaches of the Lake Erie tributaries has the greatest potential to provide additional spawning, feeding and

nursery habitat for fish, thereby increasing the reproductive potential of fish populations in Lake Erie. However, dam removal in some areas have increased sea lamprey production, making it necessary to initiate control via barriers and lampricides.

4.8 Bioregional Strategic and Management Planning

Little of the natural landscape of the Lake Erie basin remains unaltered by the effects of human actions. Even comparatively pristine habitat blocks are affected by fragmentation, water table alteration, and neighbouring habitat changes. Wildlife managers now try to maximize wildlife benefits through intensive management activities. As a result, many state/provincial, regional, national, and continental long range management plans have been developed or are in progress for many wildlife species and their habitats.

Management plans target specific objectives and goals for their planning regions, many of which fall within the Lake Erie basin. Natural heritage plans help identify priority species or habitats in need of protection. Recovery plans outline the biology, threats and limiting factors, research needs, and recovery goals for endangered and threatened species. A variety of conservation plans provide guidelines for the protection of habitats and biodiversity.

Baseline Data and GIS Maps

In order to develop the road map for an effective Lake Erie habitat strategy, it is important to have a good database mapping existing conditions. Several ongoing efforts provide some baseline information:

Big Picture Project

In 1999 the Natural Heritage Information Centre completed mapping of natural area cores and corridors in the Carolinian Zone (Canada), which overlaps extensively with the Ontario Lake Erie Basin. A CD version of the "Big Picture" is now available that provides the ability to zoom in on selected areas of the Carolinian Life Zone. The Big Picture is a living document housed at the Natural Heritage Information Centre and will be updated over time. A poster-sized version of the Big Picture Map, along with an explanatory newsprint tabloid was published in October 2000, and nearly 40,000 copies have been distributed. The purpose of these materials is to popularize the Big Picture vision and to champion the role of private landowners in making it a reality.

Carolinian Canada is also undertaking local pilot projects with several municipalities to move the Big Picture from theory to practice. A summary of the technical paper for the Big Picture Project can be found at <http://www.carolinian.org/NHIC.htm>.

Bigger Picture Project

Mapping of the natural area cores and corridors in two adjacent ecozones to the north (Ontario Ministry of Natural Resources' Site Districts 6E and 7E which include Southern Ontario and the southern portion of the Canadian Shield) is also nearing completion. The final Technical Committee meeting for the Bigger Picture project was held on November 15, 2001. Based on discussions from this meeting, additional analyses will be conducted to better incorporate coastal wetland areas that were overlooked in the preliminary analysis due to their smaller size (less than 200 ha).

US Geological Survey Gap Analysis Program

The mission of the National GAP Analysis Program is to provide regional assessment of the conservation status of native vertebrate species and natural land-cover types and to facilitate the application of this information to land-management activities. The National GAP Analysis Program is undertaken for two types of projects: terrestrial and aquatic pilots. Projects are implemented at the state or regional level and include the following five objectives: 1) map land cover at the statewide or regional scale; 2) map predicted and known distributions of vertebrate species for each state or region; 3) document the representation of vertebrate species and land-cover types in areas managed for the long-term maintenance of biodiversity; 4) provide this information to the public and to those entities charged with land-use research, policy, planning, and management; and 5) build institutional cooperation in the application of this information to state and regional management activities.

State projects in terrestrial GAP Analysis have been undertaken in all eight Great Lakes states. Land cover maps are published for New York and will be published within the next year for Pennsylvania, Michigan, Wisconsin, and Minnesota. Illinois and Ohio should be completed in 2004 and 2005, respectively, being the last states in the Great Lakes region to start terrestrial GAP Projects. An Ohio Aquatic GAP Analysis is currently underway with plans to complete GAP analyses for riverine systems and fish communities by May 2003. New projects are planned for start-up in July 2002 in Michigan, Wisconsin, and New York. Aquatic GAP projects to cover the Great Lakes region should be completed within 6 years, with work being completed for Pennsylvania, Indiana, Illinois, and Minnesota by 2007.

4.9 Upcoming Habitat Events

Work is now underway to plan a habitat workshop under the Lake Erie Millennium Plan research initiative. Researchers working on habitats of concern in Lake Erie (e.g., coastal wetlands) and on issues such as climate change, exotic species, loss of biodiversity and ecological function relevant to habitat protection and restoration in Lake Erie will be invited to attend. For further details refer to the Lake Erie Millennium Plan website: www.uwindsor.ca/erie2001.

A core committee of LaMP partner agency representatives is overseeing the development of the Lake Erie LaMP Habitat Strategy. The strategy will be in place by LaMP 2004.